

**WHAT IS CLAIMED IS:**

1. A method for manufacturing a cover assembly that can be hermetically attached to a micro-device package base to form a hermetically sealed micro-device package, the cover assembly including a transparent window portion and a frame, the method comprising the following steps:

5 providing a frame of gas-impervious material having a continuous sidewall defining a frame aperture therethrough, the sidewall including a frame seal-ring area circumscribing the frame aperture;

providing a sheet of a transparent material having a window portion defined thereupon, the window portion having finished top and bottom surfaces;

10 preparing a sheet seal-ring area on the sheet, the sheet seal-ring area circumscribing the window portion;

positioning the frame against the sheet such that at least a portion of the frame seal-ring area and at least a portion of the sheet seal-ring area contact one another along a continuous junction region that circumscribes the window portion;

15 pressing the frame against the sheet with sufficient force to produce a predetermined contact pressure between the frame seal-ring area and the sheet seal-ring area along the junction region;

heating the junction region to produce a predetermined temperature along the junction region; and

20 maintaining the predetermined contact pressure and the predetermined temperature until a diffusion bond is formed between the frame and sheet all along the junction region.

2. A method in accordance with claim 1, wherein the step of pressing the frame is performed before the step of heating the junction.

3. A method in accordance with claim 1, wherein the step of heating the junction is performed before the step of pressing the frame.

4. A method in accordance with claim 1, wherein the steps of pressing the frame and of heating the junction are performed simultaneously.
5. A method in accordance with claim 1, wherein the transparent material of the sheet is a glass.
6. A method in accordance with claim 1, wherein the transparent material of the sheet is a crystalline material.
7. A method in accordance with claim 6, wherein the crystalline material is quartz.
8. A method in accordance with claim 6, wherein the crystalline material is sapphire.
9. A method in accordance with claim 1, wherein the transparent material of the sheet is a polymeric material.
10. A method in accordance with claim 9, wherein the polymeric material is a polycarbonate plastic.
11. A method in accordance with claim 1, wherein the frame is primarily formed of an alloy having a nominal chemical composition of 54% iron (Fe), 29% nickel (Ni) and 17% cobalt (Co).
12. A method in accordance with claim 11, wherein the alloy is ASTM F-15 alloy.
13. A method in accordance with claim 11, wherein the alloy is Kovar alloy.

14. A method in accordance with claim 1, wherein during the step of heating the junction region, the temperature of the window portion of the sheet remains below the glass transition temperature ( $T_G$ ) of the transparent material.

15. A method in accordance with claim 1, wherein the step of providing a sheet of transparent material further includes applying a surface treatment to the sheet.

16. A method in accordance with claim 1, wherein the finished surfaces of the window portion are flat.

17. A method in accordance with claim 16, wherein the finished surfaces of the window portion are ground and polished.

18. A method in accordance with claim 1, wherein at least one of the finished surfaces of the window portion is contoured.

19. A method in accordance with claim 1, wherein the step of preparing a sheet seal-ring area further comprises cleaning the top and bottom surfaces of the sheet to remove contaminants.

20. A cover assembly for a micro-device package manufactured in accordance with the method of claim 1.

21. A micro-device module including a micro-device encapsulated within a package having a cover assembly manufactured in accordance with the method of claim 1.

22. A cover assembly that can be hermetically sealed to a micro-device package base to form a hermetically sealed micro-device package, the cover assembly including:

a frame of gas-impervious material having a continuous sidewall defining a frame aperture therethrough, the sidewall including a frame seal-ring area circumscribing the frame aperture; and

a sheet of a transparent material having a window portion defined thereupon, the window portion having finished top and bottom surfaces, the sheet being hermetically bonded to the frame by preparing a sheet seal-ring area on the sheet circumscribing the window portion, positioning the frame against the sheet such that at least a portion of the frame seal-ring area and at least a portion of the sheet seal-ring area contact one another along a continuous junction region that circumscribes the window portion, pressing the frame against the sheet with sufficient force to produce a predetermined contact pressure between the frame seal-ring area and the sheet seal-ring area along the junction region, heating the junction region to produce a predetermined temperature along the junction region, and maintaining the predetermined contact pressure and at the predetermined temperature until a diffusion bond forms between the frame seal-ring area and the sheet seal-ring area along the junction region circumscribing the window portion.

23. A cover assembly in accordance with claim 22, wherein the pressing of the frame is performed before the heating of the junction.

24. A cover assembly in accordance with claim 22, wherein the heating of the junction is performed before the pressing of the frame.

25. A cover assembly in accordance with claim 22, wherein the pressing of the frame and the heating of the junction are performed simultaneously.

26. A cover assembly in accordance with claim 22, wherein the transparent material of the sheet is a glass.

27. A cover assembly in accordance with claim 22, wherein during the heating of the junction region, the temperature of the window portion of the sheet remains below the glass transition temperature ( $T_G$ ) of the transparent material.

28. A cover assembly in accordance with claim 22, wherein the frame is primarily formed of an alloy having a nominal chemical composition of 54% iron (Fe), 29% nickel (Ni) and 17% cobalt (Co).

29. A micro-device module including:

a package base;

a micro-device mounted on the package base; and

a cover assembly hermetically sealed to the package base so as to encapsulate the micro-device

in a hermetically sealed cavity formed therebetween, the cover assembly including

a frame of gas-impervious material having a continuous sidewall defining a frame aperture there through, the sidewall including a frame seal-ring area circumscribing the frame aperture;

a sheet of a transparent material having a window portion defined thereupon, the window portion having finished top and bottom surfaces, the sheet being hermetically bonded to the frame by preparing a sheet seal-ring area on the sheet circumscribing the window portion, positioning the frame against the sheet such that at least a portion of the frame seal-ring area and at least a portion of the sheet seal-ring area contact one another along a continuous junction region that circumscribes the window portion, pressing the frame against the sheet with sufficient force to produce a predetermined contact pressure between the frame seal-ring area and the sheet seal-ring area along the junction region, heating the junction region to produce a predetermined temperature along the junction region, and maintaining the predetermined contact pressure and at the predetermined temperature until a diffusion bond forms between the frame seal-ring area and the sheet seal-ring area along the junction region circumscribing the window portion.

30. A micro-device module in accordance with claim 29, wherein the pressing of the frame is performed before the heating of the junction.

31. A micro-device module in accordance with claim 29, wherein the heating of the junction is performed before the pressing of the frame.

32. A micro-device module in accordance with claim 29, wherein the pressing of the frame and the heating of the junction are performed simultaneously.

33. A micro-device module in accordance with claim 29, wherein the transparent material of the sheet is a glass.

34. A micro-device module in accordance with claim 29, wherein during the heating of the junction region, the temperature of the window portion of the sheet remains below the glass transition temperature ( $T_G$ ) of the transparent material.

35. A micro-device module in accordance with claim 29, wherein the frame is primarily formed of an alloy having a nominal chemical composition of 54% iron (Fe), 29% nickel (Ni) and 17% cobalt (Co).